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ABSTRACT

A study examined the outcomes of taking different balances of career and technical education (CTE) and academic courses. The study sample consisted of members of the National Education Longitudinal Study of 1988 (NELS:88) who were eighth-graders in 1988. The study sample members were divided into four groups as follows: (1) academic concentrators (students completing only an academic concentration); (2) CTE concentrators (students completing only a CTE concentration); (3) dual concentrators (students completing both an academic and a CTE concentration); and (4) nonconcentrators (students completing neither concentration). According to NELS:88 records, the four groups constituted 36.5%, 18.94%, 6.23%, and 38.29% (respectively) of the 10,408 sample members remaining at the time of the study. From the standpoint of academic achievement, the academic concentrators ranked first, the dual concentrators ranked second, the nonconcentrators ranked third, and the CTE concentrators ranked fourth. The lowest risk of dropping out occurred when students completed three Carnegie units of CTE for every four of academic subjects. Risk of dropping out increased as the CTE/academic ratio got smaller or larger. Academic concentrators were most likely to pursue postsecondary education (87%), whereas CTE concentrators were least likely (56%). CTE concentrators were

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most likely to be in paid employment (93%), whereas academic concentrators were least likely to work (88%). (MN)

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The CTE/Academic Balance and Three Secondary Outcomes

no. 18 2002

by Michael E. Wonacott

Based on research conducted by Stephen Plank, Johns Hopkins University, and funded by the National Research Center for Career and Technical Education

In ***Career and Technical Education in the Balance: An Analysis of High School Persistence, Academic Achievement, and Postsecondary Destinations*** (St. Paul, MN: National Research Center for Career and Technical Education, 2001; https://www.nccte.org/publications/secure/index.asp), Stephen Plank reports his findings on the relationship between (1) the balance of career and technical education (CTE) and academic course-taking in high school and (2) persistence in high school, academic achievement, and postsecondary destination. The study analyzed data from the National Education Longitudinal Study of 1988 (NELS:88) on public high school students who were eighth-graders in 1988 to answer four research questions:

- What balance was struck between CTE and academic course-taking?
- Can we detect effects of the balance between CTE and academic course-taking on academic achievement, as measured by standardized tests in the areas of math, science, reading, and history?
- Can we detect effects of the balance between CTE and academic course-taking on the likelihood of dropping out of or persisting in high school?
- Can we detect effects of the balance between CTE and academic course-taking on high school graduates' immediate postsecondary involvement?

Defining the CTE/Academic Balance

The study used two different measures of the balance of CTE and academic course-taking. In the analysis of academic achievement and postsecondary destinations, two course-taking concentrations were defined:

- **Academic concentration**—completion of four Carnegie units of English and three in each of math, science, and social studies during high school (a reduced version of the New Basics advocated in *A Nation at Risk*)
- **CTE concentration**—completion of three or more Carnegie units in any of the 11 Specific Labor Market Preparation (SLMP) vocational areas of the 1998 Secondary School Taxonomy (SST)

Using those two threshold definitions, the study classified sample members into four types:

- **Academic concentrators** completed only an academic concentration.
- **CTE concentrators** completed only a CTE concentration.
- **Dual concentrators** completed both an academic and a CTE concentration.
- **Nonconcentrators** completed neither concentration.

The threshold definitions posed a problem in the analysis of high school persistence, however. Generally, the two thresholds could be met only cumulatively, over an entire high school career, yet high school dropouts, by definition, did not complete their high school careers. So in the analysis of high school persistence, the CTE/academic balance was measured by a ratio of CTE to academic credits earned:

- CTE courses included all high school Family and Consumer Sciences Education, General Labor Market Preparation, and SLMP courses (SST categories 2_A, 2_B, and 2_C).
- Academic courses included all high school Math, Science, English, and Social Studies courses (SST categories 1_1 through 1_4).

Identifying Concentrators

NELS:88 records were first analyzed to determine the distribution of concentrators. Because threshold definitions required a completed high school career, sample members who had not completed high school or whose transcript data were incomplete were excluded. Among 10,408 remaining sample members, the study identified these concentrations:

- 36.5% were Academic concentrators.
- 18.94% were CTE concentrators.
- 6.23% were Dual concentrators.
- 38.29% were Nonconcentrators.

Comparing Academic Achievement

The study next analyzed the relationship between concentrations and academic achievement. Academic achievement was measured by sample members' scores on a test battery administered in 1992 as part of NELS:88; the battery included tests developed by the Educational Testing Service in reading, math, science, and history. Available scores for each test were analyzed separately, controlling for gender, race/ethnicity, socioeconomic status (SES), and prior achievement (measured by sample members' eighth-grade test scores in reading, math, science, and history). Table 1 shows the difference in test scores of Nonconcentrators, CTE concentrators, and Dual concentrators compared to Academic concentrators. A consistent pattern emerged across all four areas of academic achievement:

- Academic concentrators showed the highest achievement.
- Dual concentrators showed the next-highest achievement, trailing by only a small margin.
- Nonconcentrators ranked third.
- CTE concentrators showed the lowest level of achievement.

The small but statistically significant advantage of Academic concentrators over

Table 1
Academic Achievement Compared to Academic Concentrators

Subject	n	Mean Score	Nonconcentrators	CTE Concentrators	Dual Concentrators
Math	8,570	48.953	-3.77	-5.71	-0.91
Science	8,511	23.667	-1.44	-1.99	-0.60
Reading	8,569	33.528	-1.61	-2.99	-0.62
History	8,452	35.065	-1.08	-1.82	-0.65

Dual concentrators might be explained by closer examination of transcript data. On average, Academic and Dual concentrators earned fairly similar numbers of Carnegie units in total math, total science, English, and social studies; means for the two groups were within 0.2 Carnegie units of each other. However, Academic concentrators completed 2.5 Carnegie units in higher math and 2.6 in higher science on average, compared to Dual concentrators' averages of 2.1 and 2.2, respectively. Since time available in semester course schedules is limited, Dual concentrators' higher levels of CTE course-taking (6.5 Carnegie units, compared to 2.4 for Academic concentrators) surely would have cut into other potential course-taking—advanced math and science, for example. Other unmeasured differences between the two groups—in the nature and quality of instruction provided or between students themselves—may have contributed as well.

Comparing High School Persistence

NELS:88 data were analyzed to determine the ratio of CTE to academic course-taking; information was available for 12,303 public high school students, including students who had dropped out, whether they returned or not. CTE/academic course-taking ratios varied from 0:1 to 1.2:1 for about 98% of all cases. Controlling for prior achievement, grades, and student background characteristics in those cases, the study found the following relationship between persistence and the ratio of CTE to academic course-taking:

- The lowest risk of dropping out was estimated to be when students complete three Carnegie units of CTE for every four Carnegie units of academic subjects.
- The risk of dropping out was estimated to increase as the CTE/academic ratio gets either smaller (closer to zero) or larger (rises above 0.77).

Apparently, the relationship between persistence and the CTE/academic ratio is strongest for students who are already at high risk of dropping out (e.g., because of low prior test scores, low grades).

Comparing Postsecondary Destinations

In 1993, one full year after most of the NELS:88 sample members graduated from high school, almost all students were engaged in postsecondary schooling or paid employment or both (see Table 2). Substantial numbers of each type of concentrator were enrolled in postsecondary education; equally, substantial numbers of each type of concentrator held paid jobs. However, controlling for gender, race, SES, and prior achievement, there were some basic differences in the likelihood of postsecondary destinations across types of concentrators:

Table 2. Likelihood of Postsecondary Destinations by Concentration (in percentages)

Destination	Nonconcentrators	CTE Concentrators	Academic Concentrators	Dual Concentrators
Not enrolled, held no job	1.9	2.8	0.9	1.0
Enrolled, held no job	6.5	4.0	10.9	7.7
Not enrolled, held no job	29.1	40.8	12.1	20.3
Enrolled/held job, primarily student	43.9	33.3	61.4	51.9
Enrolled/held job, primarily worker	18.7	19.0	14.7	19.1

Note: Figures may not add up to 100 due to rounding. Calculated for white males who match sample mean for SES and 8th-grade test scores.

- Academic concentrators were the most likely to pursue postsecondary education—87% were likely to be enrolled in postsecondary education, 72% were purely or primarily students.
- Among dual concentrators, 79% were likely to be enrolled in postsecondary education, 60% purely or primarily students.
- Among nonconcentrators, 69% were likely to be enrolled, 50% purely or primarily students.
- CTE concentrators ranked last in postsecondary participation—56% were likely to be enrolled, 37% purely or primarily students.

The likelihood of paid employment was the opposite of postsecondary enrollment:

- CTE concentrators were the most likely to be in paid employment—93% were likely to work, 60% purely or primarily workers.
- Nonconcentrators were the next most likely to hold paid jobs—92% were likely to work, 48% purely or primarily workers.
- Dual concentrators ranked third in paid employment—91% were likely to work, 39% purely or primarily workers.
- Academic concentrators were the least likely to be in paid employment—88% were likely to work, 27% purely or primarily workers.

Conclusions and Implications

The study found significant associations between different patterns of high school course-taking and three outcomes: academic achievement, persistence during high school, and postsecondary destinations.

- Academic concentrators enjoyed a statistically significant but small advantage over Dual concentrators in measures of academic achievement. Dual concentrators and Academic concentrators did not differ substantively in achievement.

- The relationship between the CTE/academic course-taking ratio and persistence during high school suggests that to reduce the risk of dropping out, the optimal ratio is three Carnegie units of CTE courses to four Carnegie units of academic courses. Especially for students who are already at risk, a slight reduction in academic test scores might be well worth the increased likelihood of graduating from high school.

- Although students' high school curricular concentrations did affect the likelihood of pursuing one postsecondary option or another, it appears that no curricular concentration precludes any postsecondary option. This suggests that the integration of CTE and academic instruction in high school is, at the most basic level, producing the intended effect—providing students with multiple options that are both attractive and available after high school.

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